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ASIATIC CHOLERA  
IN ITS  
RELATIONS TO SANITARY REFORMS.

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## ASIATIC CHOLERA IN ITS RELATIONS TO SANITARY REFORMS.

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SINCE the appearance of Asiatic cholera in Europe last summer, and especially since its arrival in the harbor of New York last autumn, and its persistence in Europe during the winter, an unusual degree of public interest in sanitary matters has been awakened throughout this country. This is due mainly to the popular apprehension lest this most dreaded of epidemic diseases should gain a foot-hold in this country during the coming summer and autumn.

Unwonted attention is given to public health administration. The national government provides additional legislation regarding quarantine. There is a general cry for cleaner streets, removal of public nuisances, and more efficient sanitary inspection. The character of the water supply is scrutinized. Measures, often more vigorous than wise, are taken to remedy sanitary defects of long growth. Hospitals for infectious diseases and modern disinfecting plants are demanded. Committees and conferences of citizens and of various civic organizations are formed. Magazines and newspapers are lending their aid, often most efficiently, toward education of the public and measures for improved sanitation. The public is readier to listen than at ordinary times.

A similar awakening of public interest in sanitation has attended the approach of cholera in the past. However near or remote one may consider a visitation of cholera, whether or not one may approve of much which is written on this subject at present, and of some of the measures urged for the prevention of this disease, anyone interested in sanitary improvements must welcome the increased attention given to this subject and the larger opportunity to secure some permanent additions to our sanitary resources. This feeling may be tempered by the fear that now as in the past excitement and sudden emergencies may lead to hasty and inconsiderate measures and foolish and wasteful expenditure of money, but this makes it all the more desirable to take advantage of the opportunity and to try to direct thought and action into the right channels.

In this way surely some good can be done. Knowledge of the simpler principles of hygiene can be more widely diffused among the people. The sanitary sense, even of the more enlightened, can be further cultivated. The inhabitants of cities may be led to take some active personal interest in the sanitary condition of their towns. Sanitary defects can be brought into clearer light





and to some extent remedied. Public health administration can be aided and improved. Possibly a hospital for infectious diseases, a public disinfecting establishment, even some important work in municipal engineering, improved methods of registration of vital statistics or better sanitary legislation can be secured.

Some knowledge of the nature and mode of distribution of infectious diseases must be useful to those interested in questions of public health, and, although each infectious disease presents its own peculiar problems there is none which can teach more important and helpful lessons in sanitation than cholera, and there is none which has had so profound an influence upon the development of modern hygiene.

Cholera is to us of the nineteenth century the chief reminder of the great pestilences of former centuries which have disappeared from civilized lands. These great pestilences were attributed for the most part to causes beyond human control, such as the anger of an offended Deity or some mysterious epidemic constitution of the atmosphere. The careful study of the mode of spread of epidemic cholera has given the early impulse and chief support to the doctrine, which is the mainspring of modern sanitation, that the causes of many infectious diseases are preventable. There is no disease about which so much has been written as concerning Asiatic cholera, the mere list of titles of books and articles on this subject occupying one hundred and forty-eight pages in the great Index Catalogue of the Library of the Surgeon-General's Office.

Although cholera has existed in parts of India probably from time immemorial, it was not until the year 1817 that it spread over India, and in the follow-

ing six years over a large part of Asia. The second cholera pandemic began in 1826, but not until 1831 did it reach for the first time western Europe, and in 1832, Canada and the United States. Each pandemic of cholera has lasted for several years, during which the disease has travelled over most of the inhabited regions of the globe, only a few remote countries, such as the islands of the Pacific ocean and Australia, having thus far escaped. According to the usual reckoning the present is the sixth of the great pandemics of cholera.

The sixty-two years which have passed since the first appearance of Asiatic cholera in western Europe have witnessed the most important developments of modern hygiene. It is interesting to note to what extent sanitary science and sanitary works have been influenced by the occurrence and the study of this disease.

It was under the direct impressions of the first terrible visitation of cholera that in England the office of Registrar General was established and William Farr was appointed to fill it. We owe to this office and to the work of this man the application of statistics to public health. As has been said by Dr. Parke, an English hygienist, "It is impossible for any nation, or for any government, to remain indifferent when in figures which admit of no denial, the national amount of health and happiness, or disease and suffering, is determined. The establishment of the Registrar General's office in 1838, and the commencement of the system of accurately recording births and deaths, will hereafter be found to be, as far as the happiness of the people is concerned, one of the most important events of our time. We owe a nation's gratitude especially to him to whose sagacity the

chief fruits of the inquiry are due, William Farr."

The English have taken the foremost place in the art of formulating laws for the protection of health and in the organization of the machinery for public health administration, which is entirely of modern growth as a separate department of government. In 1832 the dread of cholera led to an act of Parliament, empowering the privy council to take certain preventive measures against the spread of the disease, and every extensive visitation of cholera has been followed by activity in the passing of fresh sanitary acts. During the discussion in Parliament in 1875 on the Public Health Act, the most complete code of sanitary law in existence, Disraeli said, "The public health is the foundation on which repose the happiness of the people and the power of a country. The care of the public health is the first duty of a statesman."

A decisive part in the development of the doctrine that certain infectious diseases are propagated chiefly through impure drinking water and contaminated soil is traceable to the investigations concerning the mode of spread of cholera. The celebrated instance of the Broad street pump in London, in 1854, furnished conclusive evidence that the cholera poison may be conveyed by the drinking water. A distinguished modern hygienist has said, "The Broad street pump has played not only a decisive role in the cholera question, but it has furnished also the most important impulse for the development of a new era in the department of public hygiene."

That pioneer and master of modern hygiene, Max von Pettenkofer, bases to a large extent his views as to the agency of contaminated soil in the spread of

certain infectious diseases, upon forty years' study of the relations of the soil to the distribution of cholera.

These views widely held as to the propagation of some infectious diseases by the drinking water and by the soil, and based so largely upon the study of cholera, have been not of theoretical interest only, but they have influenced profoundly the practical measures which have been undertaken to preserve and promote the health of the people.

Cholera has destroyed millions of human lives, but it has been the means of saving millions more. It has been one of the levers of progress in modern sanitation. The same measures which are needed to protect a city against occasional epidemics of cholera are needed at all times to protect it against other infectious diseases, such as typhoid fever, which are spread in a similar manner, and which, although they do not come with the terrible impetuosity of cholera, steadily do their deadly work, and in the course of time destroy among us far more lives than cholera. These measures for the sanitary welfare of the people should be provided independently of the danger of cholera, but it has often happened that governments and citizens are not aroused by the common, but preventable, causes of death to undertake sanitary works, the necessity for which is evident enough to sanitarians. Unfortunately, they have required sometimes the violent impressions of an outburst of cholera to stir them to undertake these long-needed sanitary improvements. Witness at this moment Naples, Marseilles, and Hamburg, which are spending millions of dollars for destruction of insanitary quarters, for better sewage disposal, for improved water supply. But think of the thousands of lives destroyed, the

panic, the commercial depression, the untold misery through which these cities have passed before the warning was heeded.

When we consider the properties of the infectious agent of cholera and the facts established concerning the mode of spread of the disease, it is not difficult to understand why cholera should have had so large an influence upon the historical development of modern sanitary science and art, and why measures which are useful in preventing the invasion and propagation of this disease are applicable also to typhoid fever and some other infectious diseases. There have been and still are conflicting views as to some points in the causation of cholera, but as to many points there is substantial unanimity of opinion.

Asiatic cholera is an infectious disease. By an infectious disease is meant one which is produced by a specific micro-organism in the body. Whether or not an infectious disease is contagious, that is, communicable from person to person, depends upon the properties of the causative micro-organism, and especially upon the manner in which this organism is usually eliminated from the body and must be received in order to cause infection. When, as is the case with cholera, the infectious germs are discharged, solely or chiefly, by the intestine, and must be taken in by the mouth in order to cause the disease, it is evident that the disease is not likely to be conveyed directly from the sick to the healthy.

The species of bacterium which is always associated with Asiatic cholera, and which there is the best reason for believing to be the cause of the disease, is usually called the comma bacillus of Koch, from its shape and the name of its discoverer.

The recognition of this bacillus is the only absolutely positive means of diagnosis of Asiatic cholera. After the establishment of an epidemic mistakes in diagnosis are not likely to occur, and if they do, they are of little consequence, but it is important that a bacteriological examination should be made in the earliest suspected cases, in order that suitable preventive measures may be taken.

One of the most important properties of the cholera germ is that it is killed in a short time by complete drying. Bacteria float in the air with particles of dust only when they have been desiccated. Currents of air are incapable, under ordinary circumstances, of lifting bacteria from moist surfaces. The inference is therefore justifiable that the germs of cholera are not disseminated through the atmosphere, and that we can not contract the disease by taking the germs in with the air which we breathe. This inference, which is a most comforting one, is supported by observations of the mode of distribution of the disease and is manifestly of great practical importance as regards the care and prevention of cases of cholera. The cholera patient is not a source of danger to those in proximity in the same way that a small-pox or scarlet-fever patient is. Neither the patient nor his discharges infect the surrounding air. The inhumanity with which those seized with cholera are sometimes treated by the public is based upon groundless ideas as to the real sources of danger.

The cholera germs must be taken in by the mouth and swallowed in order to produce the disease in human beings. In other words, the principal sources of infection are the drink and food, sometimes the hands or other objects contaminated with cholera bacilli and



brought into contact with the mouth.

But even if the cholera germs in this way gain entrance to the stomach, there are many chances that they will not produce the disease. They are weakened or killed by acids, and the acidity of the normal juices of the stomach is an obstacle to their passage in a living and virulent condition into the intestine, which is the only part of the body where they can multiply and flourish. This teaches the importance of a healthy stomach in cholera times, and the danger of indiscretions in diet or in other ways, which impair the functions of this organ. We can understand why during epidemics of cholera there is often a marked increase in the number of cases a day or two after the carousing of a popular holiday or a Continental Sunday.

Aside from the condition of the stomach there appears to be a marked difference in individual susceptibility to cholera. A large number of persons do not contract the disease even when exposed to its causes. Some develop only a slight or moderate diarrhoea, which would not ordinarily attract attention, although the cholera bacilli may be present abundantly in the intestinal discharges. Others are carried off in a few hours by the most malignant type of the disease. To what extent these differences depend upon variations in susceptibility, or to variations in the virulence of the cholera germs, or to other causes, is not definitely known, but we know enough to indicate that among our prophylactic measures should be included such as tend to produce and to preserve individual resistance to the disease so far as this is within our control.

It is well known that the largest proportion of the victims of epidemic cholera is among the crowded poor living under

insanitary conditions. Hence it is plain that improvements in the abodes and the conditions of living of this class will do much to lessen the chances of an epidemic of cholera. Every large city has its dangerous spots, which may become breeding places of infectious diseases, and the thorough overhauling and cleaning up, often indeed the destruction, of these places are an important part of municipal sanitation.

It has already been mentioned that the cholera germs multiply only or chiefly in the intestinal tract and that they are discharged with the intestinal contents, sometimes with the vomit. They are never eliminated with the breath or from the surface of the body. The real danger from a cholera patient to other persons is in his discharges and in objects soiled with these discharges. With ordinary care and in decent conditions of living the chances of any part of these discharges being received directly into the alimentary tract of those in the immediate neighborhood of the patient are so slight that cholera is not ordinarily regarded as contagious. In properly conducted cholera hospitals instances of such contagion are very infrequent, but in the crowded homes of the poor such instances are not so uncommon, so that in every large epidemic of cholera a certain number of cases, particularly in the so-called house epidemics, are attributable to contagion in the sense in which this term is ordinarily used.

The thorough disinfection of the discharges of cholera patients and of objects soiled by them is obviously of the first importance. The cheapest and most generally applicable and efficient of the disinfectants for the discharges are milk of lime and chloride of lime of good quality. One of the great obsta-

cles to checking the spread of the disease in this way is the occurrence of mild cases, which are not recognized as cholera, but which are capable of distributing the germs.

Outside of the endemic home of cholera, in southern Bengal, Asiatic cholera is always to be referred to the importation of the cholera germs, although often the exact time and mode of entrance can not be traced. Human beings and their effects are the chief carriers of these germs. Restraint of human intercourse with infected localities has naturally been regarded as a chief measure of protection. The achievements of quarantine in keeping out cholera have been relatively to its vexations, hardships, cruelties, and interference with commerce so small that many distinguished sanitarians would discard it altogether. As we are situated in this country it would doubtless be unwise to relinquish quarantine, but all the good which can be accomplished by quarantine can be attained by scientific and humane methods, which should be uniform and under unrestricted national control.

The public should realize that quarantine is at best an uncertain and often inefficient protection against cholera, and that far greater safety is to be sought in measures which render the city or locality unsuitable for the multiplication and distribution of the germs of the disease. All great epidemics of cholera are referable to infection of the locality. One of the fundamental facts in the epidemiology of cholera is that the disease has been introduced time and again into certain places without spreading, whereas at other times or in other places the introduction of a single case has been the starting point of a terrible epidemic. There are cities

which are naturally immune against the epidemic spread of cholera; there are other cities which have made themselves virtually cholera-proof. It is this predisposition in time and in place which has been and is still the subject of much of the controversial literature regarding cholera.

We do not know the nature of all of the local and seasonal factors concerned in the causation of epidemics of cholera, but concerning some we have sufficient information to indicate the line of action to be pursued in endeavoring to make a place unsuitable for the spread of the disease. From what has already been said in this article it is clear that the susceptibility of a place to cholera must depend in very large measure upon the facility with which the discharges of cholera a patient can get into the soil and into the sources of supply of the drinking water. In other words, the characters of the drainage, of the disposal of sewage and of the water supply will often decide the fate of a city when cholera has been introduced. The evidence that some of the great epidemics of cholera and especially of the explosive outbursts of the disease are due to infection of the water supply seems conclusive. The recent epidemic in Hamburg will be cited hereafter as a classical example of a drinking-water epidemic.

The lesson to be learned from experience seems clear enough. A city can make itself nearly if not wholly immune against cholera. This requires much time, money, and intelligence. It demands the aid of skilled sanitary knowledge. The problems of municipal sanitation must be appreciated by intelligent public opinion, but they can be solved only by those who have special knowledge and who are trained for



the purpose. The necessity of calling in the assistance of skillful sanitary experts for the work of municipal sanitation is one of the most important objects of education of the public in sanitary matters. As soon as there is a demand for those possessed of the requisite training, there will be no lack of the supply.

The problems of protection of a city against cholera are essentially the problems of municipal sanitation in general. They relate to such matters as the protection of the water supply against contamination; to the proper disposal of sewage; to good drainage; to cleanliness of streets; to improvement or removal

of insanitary quarters; to thorough sanitary inspection; to the provision of public disinfecting establishments, public bathing places, and hospitals for infectious diseases; to education of the public in hygiene; to the employment of sanitary experts. If the apprehension of an invasion of Asiatic cholera and the consequent interest in sanitary matters should prove the incentive to sanitary reforms, there will result permanent increase in happiness and health and the prevention of other infectious diseases, which, although less dreaded because they are more familiar, are in reality more serious and constant objects of concern than cholera.







